GSAS v5.0 Release Notes

GSAS Team

September 2005

Introduction

Version 5.0 is a major release of GSAS. Most changes affect the Level1B and Level2 products. Only minor changes were made in L1A processing.

L1A Change Summary

A correction was made to the EU conversion of GLA04 IST i_VTBoreH and i_VTBoreV.

Altimetry Change Summary

The key change made to the altimetry products is the lengthening of all of the L1B and L2 products allowing space for new variables and additional growth. These new variables include:

- A high-resolution DEM value from the SRTM V1 90m resolution DEM for latitudes between 60N and 60S
- Gain and received energy placed on all of the level 1b and 2 products.
- Surface pressure, temperature, and relative humidity on all level 2 products
- Saturation range correction for low gain (13 counts) returns.
- 1064nm cloud top and integrated signal from the lidar team (40Hz)

Changes have been made to both the transmit and received energy calculations as suggested by the instrument team. For details of the energy computation see the waveform ATBD.

Two minor changes have been made to the standard parameterization waveform fitting. The standard fit now uses the absolute peak location change instead of a percentage change as the convergence criteria in the gaussian fitting. An error in the computation of the standard fit sigma has also been corrected. Neither of these changes has significantly affected the elevations on the data.

In the alternate waveform fitting, an option to normalize the waveform based on the peak amplitude was implemented. An error in reporting the alternate fit standard deviation was corrected and the precision was changed on the product to accommodate the smaller numbers. The alternate fit parameters were changed to perform normalization by peak amplitude before fitting, the minimum distance between selected peaks was set to be greater than 15 ns, and the weight of the sigma widths was tuned to provide the best alternate fits on selected land waveforms.

Atmosphere Change Summary : Status and Limitation of 1064 Cloud Detection.

Through ISIPS release 23, cloud detection using the GLAS 1064 nm atmospheric channel was limited to 4 and 1 second resolution. This was due mainly to the low inherent signal to noise of the 1064 data. Over the last 6 months or so, we have been striving to produce 1064 cloud top height on a shot to shot basis (40 Hz). The new algorithms have been tested and are included in this release of GSAS. The limited amount of testing done to date has shown that we can definitely detect clouds at this resolution, though the exact limits of what can be detected (in terms of optical depth) have not yet been quantified. An assessment will be performed after the laser 2a data has been reprocessed using this release of the GSAS software by comparing the 1064nm cloud detection with that of the 532nm channel. A part of the cloud detection algorithm is based on the integrated 1064 nm signal, which is also stored as a separate quantity on the release 24 GLA09 product. Testing has shown that when the magnitude of the integrated signal exceeds a certain threshold, it is highly likely (as corroborated by the 532 channel) that there is a cloud present even if the thresholding algorithm did not detect a cloud. In this case, the cloud height is set to 10 km and a flag is set to indicate this fact. The algorithm also interrogates the ground return signal width in an effort to detect very low clouds. Over flat terrain like the ice sheets, the 1064 ground return signal has a characteristic width. When this signal is unusually wide, and clouds have not been detected higher up, the cloud top height is set to 100 m and a flag is set to indicate the likely presence of low clouds. While these approaches improve the overall cloud detection, they too have their limits. We'll have to wait until we can perform extensive testing to determine what those limits are.

Product Format/Definition Change Summary

Record length was changed for the following products:

```
GLA06: 6880
GLA11: 3032
GLA12: 6600
GLA13: 6760
GLA14: 10000
GLA15: 6280
```

GLA05:

Changed scale and Max Value for parameters: d_wfFitSDev_1, d_wfFitSDev_2 & d_DevFitTr. Scales from 0.001 to 0.0d-5 and max value from 300 to 3000.

Changed the description for i_elvflg and i_SurfRuf_slpQF

Changed spare6 to spare6 (110).

Added the following new parameters:

```
i_RecNrgAll  (40)
```

GLA06:

Changed record length to 6880.

Changed the description for i_elvflg and i_SurfRuf_slpQF

Changed definitions for i_CorrStatFlg

Added i_DEM_hires_src & i_DEM_hires_elv and a PDF created for i_DEM_hires_src

Changed spare7 to spare7 (556)

Added the following new parameters:

```
i_DEM_hires_src (40)
i_DEM_hires_elv (40)
i_satNdx(40)
i_satRngCorr(40)
i_satCorrFlg(40)
i_satNrgCorr(40)
i_satPwdCorr(40)
i_gval_rcv(40)
i_RecNrgAll(40)
i_FRir_cldtop(40)
i_FRir_qaFlag(40)
i_FRir_ODflg(40)
i_FRir_intsig(40)
i_msRngCorr (40)
i_msCorrFlg (40)
i_Surface_temp
i_Surface_pres
i_Surface_relh
```

GLA07:

Changed definitions for i1_g_bscs_qf in i_532AttBS_Flag

Changed spare4 to spare4 (130)

Added the following new parameters:

```
i_Surface_temp
i_Surface_pres
i_Surface_relh
i_Surface_wind
i_Surface_wdir
```

GLA08:

Changed spare2 to spare2 (264)

Added the following new parameters:

```
i_SolarAngle  (4)
i_Aer_top_b20_temp (5)
i_Aer_top_b20_pres (5)
i_Aer_top_b20_relh (5)
i_Aer_bot_b20_temp (5)
i_Aer_bot_b20_pres (5)
i_Aer_bot_b20_relh (5)
i_Aer_top_a20_temp (3)
i_Aer_top_a20_pres (3)
i_Aer_top_a20_relh (3)
i_Aer_bot_a20_temp (3)
i_Aer_bot_a20_pres (3)
```

```
i_Aer_bot_a20_relh (3)
i_Aer_PBL_LR_temp
i_Aer_PBL_LR_pres
i_Aer_PBL_LR_relh
i_Aer_ir_top  (2)
i_Aer_ir_bot  (2)
i_Aer_ir_layflg (2)
i_Aer_ir_top_temp (2)
i_Aer_ir_top_pres (2)
i_Aer_ir_top_relh (2)
i_Aer_ir_bot_temp (2)
i_Aer_ir_bot_pres (2)
i_Aer_ir_bot_relh (2)
i_Surface_temp (4)
i_Surface_pres (4)
i_Surface_relh (4)
i_Surface_wind (4)
i_Surface_wdir (4)
```

GLA09:

Changed scaling in id_FRg_grd_sig and d_FRir_grd_sig, from 1.0d-11 to i.0d-9 plus changed prod units from e11/m-sr to e9/m-sr

Changed spare4 to spare4 (590)

Created PDF for i_LRir_QAflag

Added the following new parameters:

```
i_FRir_cldtop (160)
i_FRir_qaFlag (160)
i_FRir_intsig (160)
i_SolarAngle  (4)
i_LRir_cld_top (10)
i_LRir_cld_bot (10)
i_LRir_QAflag (10)
i_LRir_cldtop_temp (10)
i_LRir_cldtop_pres (10)
i_LRir_cldtop_relh (10)
i_LRir_cldbot_temp (10)
i_LRir_cldbot_pres (10)
i_LRir_cldbot_relh (10)
i_MRir_cld_top (10,4)
i_MRir_cld_bot (10,4)
i_MRir_QAflag (10,4)
i_MRir_cldtop_temp (10,4)
i_MRir_cldtop_pres (10,4)
i_MRir_cldtop_relh (10,4)
i_MRir_cldbot_temp (10,4)
i_MRir_cldbot_pres (10,4)
i_MRir_cldbot_relh (10,4)
i_LRg_cldtop_temp (10)
i_LRg_cldtop_pres (10)
i_LRg_cldtop_relh (10)
i_LRg_cldbot_temp (10)
i_LRg_cldbot_pres (10)
i_LRg_cldbot_relh (10)
```

```
i_MRg_cldtop_temp (10,4)
i_MRg_cldtop_pres (10,4)
i_MRg_cldtop_relh (10,4)
i_MRg_cldbot_temp (10,4)
i_MRg_cldbot_pres (10,4)
i_MRg_cldbot_relh (10,4)
i_LRg_SourceFt
i_MRg_SourceFt (4)
i_HRg_SourceFt (20)
i_LRir_SourceFt
i_MRir_SourceFt (4)
i_Surface_temp (4)
i_Surface_pres (4)
i_Surface_relh (4)
i_Surface_wind (4)
i_Surface_wdir (4)
```

GLA10:

Changed spare5 to spare5 (292)

Added the following new parameters:

```
i_SolarAngle  (4)
i_MRg_cldtop_temp (10,4)
i_MRg_cldtop_pres (10,4)
i_MRg_cldtop_relh (10,4)
i_MRg_cldbot_temp (10,4)
i_MRg_cldbot_pres (10,4)
i_MRg_cldbot_relh (10,4)
i_Aer_top_temp (9)
i_Aer_top_pres (9)
i_Aer_top_relh (9)
i_Aer_bot_temp (9)
i_Aer_bot_pres (9)
i_Aer_bot_relh (9)
i_Surface_temp (4)
i_Surface_pres (4)
i_Surface_relh (4)
i_Surface_wind (4)
i_Surface_wdir (4)
```

GLA11:

Changed record length to 3032.

Created PDF for i_LRir_QAflag and i_MRir_QAflag

Added description values for i_cld1_flag, i_aer4_flag, and i_pbl4_flag

Changed spare3 to spare3 (144)

Added the following new parameters:

```
i_SolarAngle  (4)
i_MRg_cldtop_temp (10,4)
i_MRg_cldtop_pres (10,4)
i_MRg_cldtop_relh (10,4)
i_MRg_cldbot_temp (10,4)
i_MRg_cldbot_pres (10,4)
```

```
i_MRg_cldbot_relh (10,4)
i_Aer_top_temp (9)
i_Aer_top_pres (9)
i_Aer_top_relh (9)
i_Aer_bot_temp (9)
i_Aer_bot_pres (9)
i_Aer_bot_relh (9)
i_Aer_ir_top  (2)
i_Aer_ir_bot  (2)
i_Aer_ir_top_temp (2)
i_Aer_ir_top_pres (2)
i_Aer_ir_top_relh (2)
i_Aer_ir_bot_temp (2)
i_Aer_ir_bot_pres (2)
i_Aer_ir_bot_relh (2)
i_MRir_cld_top (10,4)
i_MRir_cld_bot (10,4)
i_MRir_cldtop_temp (10,4)
i_MRir_cldtop_pres (10,4)
i_MRir_cldtop_relh (10,4)
i_MRir_cldbot_temp (10,4)
i_MRir_cldbot_pres (10,4)
i_MRir_cldbot_relh (10,4)
i_MRir_QAflag (10,4)
i_Aer_PBL_LR_temp
i_Aer_PBL_LR_pres
i_Aer_PBL_LR_relh
i_Surface_temp (4)
i_Surface_pres (4)
i_Surface_relh (4)
i_Surface_wind (4)
i_Surface_wdir (4)
i_Aer_ir_OD (2)
i_cld_ir_OD (10,4)
i_Aer_ir_ODFlg (2)
i_cld_ir_ODFlg (10,4)
i_FRir_ODFlg (160)
i_FRir_qaFlag (160)
i_FRir_cldtop (160)
i_Aer_b20_prop (20,5)
i_PBL_prop (20)
```

GLA12:

Changed record length to 6600.

Changed the description for i_elvflg and i_SurfRuf_slpQF

Changed definitions for i_CorrStatFlg

Changed spare7 to spare7 (566)

Added the following new parameters:

```
i_DEM_hires_src (40)
i_DEM_hires_elv (40)
i_satNdx(40)
i_satRngCorr(40)
i_satCorrFlg(40)
```

```
i_satNrgCorr(40)
i_satPwdCorr(40)
i_gval_rcv(40)
i_RecNrgAll(40)
i_FRir_cldtop(40)
i_FRir_qaFlag(40)
i_FRir_ODflg(40)
i_FRir_intsig(40)
i_msRngCorr (40)
i_msCorrFlg (40)
i_Surface_temp
i_Surface_pres
i_Surface_relh
```

GLA13:

Changed record length to 6760.

Changed the description for i_elvflg and i_SurfRuf_slpQF

Changed definitions for i_CorrStatFlg

Changed spare8 to spare8 (566)

Added the following new parameters:

```
i_DEM_hires_src (40)
i_DEM_hires_elv (40)
i_satNdx(40)
i_satRngCorr(40)
i_satCorrFlg(40)
i_satNrgCorr(40)
i_satPwdCorr(40)
i_gval_rcv(40)
i_RecNrgAll(40)
i_FRir_cldtop(40)
i_FRir_qaFlag(40)
i_FRir_ODflg(40)
i_FRir_intsig(40)
i_msRngCorr (40)
i_msCorrFlg (40)
i_Surface_temp
i_Surface_pres
i_Surface_relh
```

GLA14:

Changed record length to 10000.

Changed the description for i_elvflg and i_SurfRuf_slpQF

Changed definitions for i_CorrStatFlg

Added i_DEM_hires_src & i_DEM_hires_elv and a PDF created for i_DEM_hires_src

Changed spare7 to spare7 (566)

Added the following new parameters:

```
i_DEM_hires_src (40)
```

```
i_DEM_hires_elv (40)
i_satNdx(40)
i_satRngCorr(40)
i_satCorrFlg(40)
i_satNrgCorr(40)
i_satPwdCorr(40)
i_gval_rcv(40)
i_RecNrgAll(40)
i_FRir_cldtop(40)
i_FRir_qaFlag(40)
i_FRir_ODflg(40)
i_FRir_intsig(40)
i_msRngCorr (40)
i_msCorrFlg (40)
i_Surface_temp
i_Surface_pres
i_Surface_relh
```

GLA15:

Changed record length to 6280.

Changed the description for i_elvflg and i_SurfRuf_slpQF.

Changed definitions for i_CorrStatFlg

Changed spare7 to spare7 (594)

Added the following new parameters:

```
i_satNdx(40)
i_satRngCorr(40)
i_satCorrFlg(40)
i_satNrgCorr(40)
i_satPwdCorr(40)
i_gval_rcv(40)
i_RecNrgAll(40)
i_FRir_cldtop(40)
i_FRir_qaFlag(40)
i_FRir_ODflg(40)
i_FRir_intsig(40)
i_msRngCorr (40)
i_msCorrFlg (40)
i_Surface_temp
i_Surface_pres
i_Surface_relh
i_Surface_wind
i_Surface_wdir
```

ANC07 Constants Change Summary

ANC07_01 (Globals):

Old Value	**New Value**
GD_THRNSIGR = 0.0d0	GD_THRNSIGR = 4.5d0
	gd_minRANrg = 0.5d-18
	gd_minR1Nrg = 0.5d-18

ANC07_02 (Atmosphere) :

Old Value	New Value
	GI_IR_CLDSMTH_HWD_PRELM = 1
	GI_IR_CLDSMTH_TYPE_PRELM = 2
	GI_IR_CLDSMTH_HWD_PRIME = 3
	GI_IR_CLDSMTH_TYPE_PRIME = 1
	GD_IR_MAX_ENERGY = 10.0D0
	GI_IR_CLD_LOWBIN_ADJ = 2
	GI_IR_CLD_CONSEC = 4
	GD_IR_CLOUD_THRESH = 1.10D-5
	GD_INTEG_THRESHOLD = 1.0D-7
	GD_ISIG_CLOUD_THR = 0.50D-5
	GI_LOW_CLOUD_COUNT = 3

ANC07_03 (Elevation) :

Old Value	New Value
	GI_MIN_SATNDX = 2

ANC07_04 (Waveforms) :

Old Value	New Value
	D_MAXSDEV = 0.3d0
D_INTV_MIN1 = 5.0d0	D_INTV_MIN1 = 15.0d0
	I_NORMTYPE = 1
D_DTMCK2 = 0.02d0	D_DTMCK2 = 0.07d0
	I_TMCKSW1 = 0
	I_TMCKSW2 = 1
D_WT_SGM = 0.01d0	D_WT_SGM1 = 0.03d0
	D_WT_SGM2 = 0.001d0

ANC07_05 (L1A) :

Old Value	New Value
GD_LMB1REF_T_LIM = 10d0,15d0,34d0,35d0	GD_LMB1REF_T_LIM = 9d0,10d0,30d0,35d0
GD_LSR1DBLR_T_LIM = 10d0,15d0,38.6d0,3+	GD_LSR1DBLR_T_LIM = 10d0,35d0,45d0,55d+
GD_L1ELEC_T_LIM = 10d0,15d0,38d0,40d0	GD_L1ELEC_T_LIM = 0d0,4d0,34d0,40d0
GD_LSROSC_C_LIM = 81d0,82d0,95d0,96d0	GD_LSROSC_C_LIM = 0d0,82d0,95d0,96d0
GD_LSRAMP_C_LIM = 95d0,96d0,101d0,102d+	GD_LSRAMP_C_LIM = 0d0,96d0,101d0,102d0
GD_LSRDR_PW_LIM = 185d0,195d0,205d0,21+	GD_LSRDR_PW_LIM = 0d0,185d0,215d0,220d+
GD_LMB2REF_T_LIM = 10d0,15d0,34d0,35d0	GD_LMB2REF_T_LIM = 9d0,10d0,30d0,35d0
GD_LSR2DBLR_T_LIM = 10d0,15d0,39.3d0,3+	GD_LSR2DBLR_T_LIM = 10d0,35d0,45d0,55d+
GD_LSR2OSC_T_LIM = 10d0,15d0,32.2d0,35+	GD_LSR2OSC_T_LIM = 10d0,15d0,34.5d0,35+
GD_L2ELEC_T_LIM = 10d0,15d0,38d0,40d0	GD_L2ELEC_T_LIM = 0d0,4d0,34d0,40d0
GD_LMB3REF_T_LIM = 10d0,15d0,33.4d0,35+	GD_LMB3REF_T_LIM = 9d0,10d0,30d0,35d0
GD_LSR3DBLR_T_LIM = 10d0,15d0,40.4d0,4+	GD_LSR3DBLR_T_LIM = 10d0,35d0,45d0,55d+

GD_LSR3OSC_T_LIM = 10d0,15d0,32.7d0,35+	GD_LSR3OSC_T_LIM = 10d0,15d0,34.5d0,35+
GD_L3ELEC_T_LIM = 10d0,15d0,38d0,40d0	GD_L3ELEC_T_LIM = 0d0,4d0,34d0,40d0
GD_PRIMAD550V_LIM = 403d0,422d0,578d0,+	GD_PRIMAD550V_LIM = -20d0,422d0,578d0,+
GD_SECAD550V_LIM = -30d0,-20d0,20d0,30+	GD_SECAD550V_LIM = -30d0,-20d0,20d0,42+
GD_SPCM1_550V_LIM = -30d0,-20d0,20d0,3+	GD_SPCM1_550V_LIM = -20d0,510d0,578d0,+
GD_SPCM2_550V_LIM = -30d0,-20d0,20d0,3+	GD_SPCM2_550V_LIM = -20d0,510d0,578d0,+
GD_SPCM5_550V_LIM = -30d0,-20d0,20d0,3+	GD_SPCM5_550V_LIM = -20d0,525d0,578d0,+
GD_SPCM6_550V_LIM = -30d0,-20d0,20d0,3+	GD_SPCM6_550V_LIM = -20d0,505d0,578d0,+
GD_SPCM8_550V_LIM = -30d0,-20d0,20d0,3+	GD_SPCM8_550V_LIM = -20d0,505d0,578d0,+
GD_BUSAINST_28V_LIM = 25d0,26d0,34d0,3+	GD_BUSAINST_28V_LIM = 24d0,25d0,34d0,3+
GD_BUSBL1_V_LIM = 25d0,26d0,34d0,35d0	GD_BUSBL1_V_LIM = -1d0,24.3d0,34d0,35d+
GD_BUSBL1_C_LIM = -4.9d0,-3.5d0,3.5d0,+	GD_BUSBL1_C_LIM = -3.5d0,3.3d0,5d0,5.5+
GD_BUSCL2_V_LIM = -2d0,-1d0,4.5d0,5d0	GD_BUSCL2_V_LIM = -1d0,24.3d0,34d0,35d+
GD_BUSCL2_C_LIM = -4.9d0,-3.5d0,0.5d0,+	GD_BUSCL2_C_LIM = -3.5d0,3.3d0,5d0,5.5+
GD_BUSDL3_V_LIM = -2d0,-1d0,4.5d0,5d0	GD_BUSDL3_V_LIM = -1d0,24.3d0,34d0,35d+
GD_BUSDL3_C_LIM = -4.9d0,-3.5d0,0.5d0,+	GD_BUSDL3_C_LIM = -3.5d0,3.3d0,5d0,5.5+
GD_PRTAD1C24_T_LIM = -13d0,-8d0,30d0,4+	GD_PRTAD1C24_T_LIM = -13.5d0,-8d0,30d0+
GD_PDBIASC38_V_LIM = 43d0,45d0,47d0,57+	GD_PDBIASC38_V_LIM = 17d0,45d0,47d0,57+
gd_ist_boreh=0.0d0, 0.5d0	gd_ist_boreh=0.0d0, 412529.72d0
gd_ist_borev=0.0d0, 0.5d0	gd_ist_borev=0.0d0, 412529.72d0

Known Problems

More improvements to waveform processing are forthcoming, including better normalization, alternate fitting, and saturation algorithms.

New parameters i_Surface_wind and i_Surface_wdir are not yet filled.

New parameters i_LRg_SourceFt , i_MRg_SourceFt, i_HRg_SourceFt, i_LRir_SourceFt, i_MRir_SourceFt, i_cld_ir_OD, i_Aer_ir_OD, i_Aer_b20_prop, i_PBL_prop ,Aer_ir_ODFlg, Cld_ir_ODFlg and FRir_ODFlg are not yet filled.

GLA01%main%i_TxFlg is not always correctly set.

The STRM track files will be improved and updated to V2.

Release Information

The ClearCase label for this release is RELEASE_5.0.

The release date is October 11, 2005.

All internal version numbers have been updated to “V5.0 September 2005". This should be verified during operation by checking the version information in the appropriate ANC06 files.

SDMS Impact

The distribution tarfile is on glasdev.wff.nasa.gov at the following location:

```
/glasdev1/v5/dist/gsas_V5.0.tar.Z.
```

ANC Files

New versions of the ANC07, ANC45 and ANC46 data files are required.

Two new filetypes have been created: ANC51 and ANC52.

ANC52 is a required input for Elevation processing.

ANC51 is a required input for Elevation processing. ANC51 is a multi-file granule. The correct granules must be chosen to match the data which is to be processed. The ANC51 requirement can be overridden by placing a "ELEVATION_PROCESS=E_Supress_SRTM" line in the control file.

Bundle Changes

(See above)

Compilation

All libraries and binaries should be recompiled using the top-level Makefile. **IMPORTANT: due to internal changes in the makefiles, SDMS MUST use the command "make runtime" to ensure the software is made without debug flags.**

The process for making the libraries and binaries is as follows **(NOTE: SDMS ONLY!!)**

```
cd /install_dir/gsas_v5.0
make runtime
make install
```

Note : developers should not use the above procedure. This procedure is for SDMS only!

Detailed Change Notes

0002128: D_WT_SGM should be changed to D_WT_SGM1 and D_WT_SGM2

The waveform constant D_WT_SGM was be changed to D_WT_SGM1 and D_WT_SGM2 so that the standard and alternate fits can be optimized separately.

0002119: GLA04 IST Boresight scale error

Fixed L1A conversion problem for ist_boreh and ist_borev on GLA04_04.

0002117: Flags not assigned in GLA*scal_mod.f90

Some new flags now have A2P and P2A code in the appropriate GLAxx_scal_mod.f90.

0002113: Saturation range correction not passed through from GLA06 to GLA12-15

Fixed a GSAS 5.0 problem where certain passthrus were not being populated.

0002111: Normalize WF Fits With Peak Amplitude

Added I_NORMTYPE to anc07_0004. When it is set to 0, waveforms are normalized using area, and when it is set to 1, waveforms are normalized using the maximum amplitude of the waveform. Changed D_WT_SGM from 0.001 to 0.03, and D_INTV_MIN1 from 5.0 to 15.0 .

0002109: IEEE Overflow in Atmosphere Optical Properties

Corrected IEEE overflow in atmosphere code.

0002108: GLA07 variables in Product Database

Changed the variable ID's of i_Rng2PCProf & i_Rng2CDProf by adding "_Cor" to the variable. No change to the parameters for i_Rng2PCProf_Cor & i_Rng2CDProf_Cor. But added to the description "This variable has a slight correction applied to it."

0002105: Update GSAS scf_prod_reader subroutines to support 5.0 formats

Updated the scf_product_reader subroutines to support the new GSAS 5.0 product formats.

0002103: inconsistent beam colelev and azimuth

Beam co-elevation and azimuth are calculated using different range values in glas_atm and glas_alt. The precision orbits are not available when the co-elevation and azimuth and elevation are calculated for the atmosphere products, therefore, the reference range is used. This was done by design and is not an error.

0002100: ANC45/46 Need Update for GSAS 5.0

Updated the VersionID to 24 for all anc45 files, and updated the VersionDescription to the following.

GLA01-GLA04

GSAS version 5.0 (see I-SIPS Product Release notes), POD and PAD versions differ, see header and I-SIPS Release Information table.

GLA05-GLA15

GSAS version 5.0 (see I-SIPS Product Release notes about new formats), POD and PAD versions differ, see header and I-SIPS Release Information table.

Created anc46 files for anc51, and anc52.

0002097: Error in CalcSum Corrs Logic

Fixed a small error in the invalid value-avoidance logic of Elev_Support:CalcSumCorrs.

0002091: Change Scale of d_wfFitSDev

Changed scale of d_wfFitSDev and d_sDevFitTr from 0.001 to 0.00001, and added d_maxSDev (=0.3) to anc07_0004.

Changes have been made to the Product Database for GLA05 parameters d_wfFitSDev_1, d_wfFitSDev_2, & d_DevFitTr. Product Max Value changed from 300 to 30000 and Alg Scale changed from 0.001 to 1.0d-5 in all three parameters.

0002090: Update Product Code from Tested Non-vob Code

Updated the product code from code which was modified outside the vob. Code was tested and verified by the atmosphere team. Two files were updated: gla09_flags_mod and gla09_scal_mod.

0002086: Flags in GLA09_alg_mod.f90 Initialized as Invalid

Corrected. Merged in 2090.

0002085: HiRes DEM Crash

Work completed, reviewed. Code with corrections are on branches pr2085 and wpr2085. Runs supporting the elimination of the crash condition are on isipsdb1 under /playground/sfm/glas_alt, in subdirectories crash_wi_tr and crash_wo_tr. Code merged.

0002084: i_MRir_QAflag Error in GLA11_alg_mod.f90

Fixed definition of i_MRir_QAflag.

0002083: i_LRCir_af, i_MRCir_af in GLA09_alg_mod.f90?

The i_LRir_QAflag flag and i_MRir_QAflag constructs have been modified. The only change to the i_LRir_QAflag in GLA09 is that the "af" portion of the flag has been moved to bits 0-3 of byte 5. This connects it with QAflag values, and renders all spares into contiguous storage within that variable. The i_MRir_QAflag has been modified in GLA09 and GLA11 such that it is now represented by an I*1(40) array. The QAflag portion has been stored such that interval 1 is in bytes 40-36, interval 2 in bytes 35-31, interval 3 in bytes 30-26, and interval 4 in bytes 25-21. Each of the 10 layer flags per interval is 4 bits in length as before, such that interval 1 layer 1 is in bits 0-3 and interval 1 layer 2 is in bits 4-7 of byte 40, interval 1 layer 3 is in bits 0-3 and interval 1 layer 4 is in bits 4-7 of byte 39, etc. The 4 "af" flags (4 bits each) are concatenated with the QAflag storage and are contained in bytes 20-19 starting at bit 0 of byte 20. The remaining bytes

1-18 are maintained as spares. Individual values of the af and QAflag components do not change from previous descriptions.

0002082: Error in GLA08_alg_mod.f90

Changed variables in GLA08_alg_mod.f90.

0002081: Error in GLA05_scal_mod.f90

Corrected the gi_invalid statement from gi_invalid_i4b to gi_invalid_i2b in GLA05_scal_mod.f90. This was in cr2080 and unit tested in the same.

0002080: Unit Test Product Modifications

Used the product unit test code to verify the GSAS 5.0 product modifications. Unit test completed for GLA05 – GLA15.

0002079: Add 40Hz Lidar Cloud Information from GLA09,11 to GLA06/12-15

Added the following atmosphere parameters to GLA06,12-15

GLA09%d_FRir_cldtop
GLA09%i_FRir_qaFlag
GLA09%d_FRir_intsig
GLA11%i_FRir_ODflg

Note that i_FRir_ODflag is not yet computed by a science algorithm and is currently only a placeholder.

0002078: Alternate Fit Anc07 Constant Change

Changed D_WT_SGM.

0002076: i_elvflg and i_SurfRuf_slpQF are Inconsistent between GLA06 and GLA14

Added the following description to the variable i_SurfRuf_slpQF that is in GLA06,12,14. For GLA06 and 12-15, bits are set to reflect Standard Fitting. For GLA14, bits are set to reflect Alternate Fitting. Although defined as a pass-thru, the values are different on GLA06/12-15 and GLA14."

0002075: i_SigmaElv is Incorrect on GLA06

Code was modified such that GLA06 i_SigmaElv is consistently undefined.

0002074: The High Gain Saturation Flag in GLA05%l_WFqual Might not be Set Correctly

Using width of maxPeak instead of last pk for determining high gain saturation for laser 3.

0002062: Undefined cloud layer quality flags in GLA09

The following atmosphere flags are now defined and documented:

i_LRCL_Flag, i_MRCL_Flag, i_HRCL_Flag, i_FRCL_Flag

0002056: Change d_ThrNSigR

Changed d_ThrNSigR in anc07_0001 from 2.0d0 to 4.5d0

0002055: Incomplete Documentation for Lidar Flags

The quality and use flags (i_cld1_flag, i_aer4_flag, and i_pbl4_flag) for GLA11 were properly defined by Mantis 0002029.

0002054: Confirm and Correct Behavior of SRTM Code for Use under SDMS

Software has been modified to electively supress inclusion of the SRTM high resolution elevations data when creating GLAS elevations products.

0002050: GLA09 Med Res (1 Hz) Quality Flags are Weird

The problem with the medium resolution (1/sec) cloud quality flags was found. There was a coding error in the routine "fpk_MRCL_Flag" that caused the quality flag to be stored in reverse time order as indicated in the documentation. No other medium resolution flags had this problem nor did it affect either the low (1/4 sec), high (5/sec) or full (40/sec) cloud quality flags.

Changed also on the branch was the 532 laser energy lower limit cutoff for daytime processing from 4.0 mJ to 5.5 mJ. This was a hard coded number within AtmMgr_mod.f90 and it was changed so that all of laser 3 532 nm data would not be processed during the day.

0002049: QAPCompare Formatted Out Error

A problem that caused metadata values to overflow the output field and print as a string of asterisks was fixed.

0002048: Coordinate GSAS 5.0 Product Structure Changes

Coordinated the documentation and coding of the GSAS 5.0 product structure changes.

0002045: Error in QAP Headers for Files Written by QAPG

Header records for file start and end date/time were corrected.

0002042: Add Energy and Received Gain to Higher Level Altimeter Products

Added the following parameters to GLA06,12-15

i_satNdx
i_RecNrgAll
i_gval_rcv

i_Surface_temp
i_Surface_pres
i_Surface_relh

0002036: atmQF Flag Not Reset Dynamically

Change was made to atmqf flag as directed. (1=atmqf forward scatting flag has not been set - no valid Atmosphere data available for this shot)

0002034: Waveform Fit Standard Method Location /Convergence Change

Changed standard fit to use a specific value (0.07 ns) for convergence of the location parameter instead of a percentage change (2%).

0002033: Add New Variable to GLA06 and Higher Elevation Products

Verification made that GSAS v5.0 has parameters added in all of the product 6,13,15 prod, scal, and alg modules. What remains is to set these parameters when making an elevation run. This entry was handled under Mantis 2042, and verified.

0002029: GLA11 Quality and Use Flags

Added defined values for the quality and use flags in parameters i_cld1_flag, i_aer4_flag, and i_pbl4_flag of GLA11.

0002027: i_AttFlg1 Incorrectly Defined

On GLA08-11, i_AttFlg1 was changed to be a 2-byte integer, not a 1-byte integer. It now has an array size of 4, instead of a single value.

0002025: Addition of Meteorology Data to GLA08-11

Temperature, atmospheric pressure, and relative humidity have been added to atmospheric products for the various detected cloud and aerosol layers, as well as for the surface conditions. This mantis was also used to resolve a minor flga calculation problem in modules A_1s_1064_det_mod.f90 and A_4s_1064_det_mod.f90.

0002023: Update L1A ATBD

The updates as listed in the Description section of this Mantis item have been made and approved. The GLAS web site has been updated with the latest version of the document.

0002022: GLA09 Data Product Scaling Factor Documentation Error

Changed values for parameters i_FRg_grd_sig & i_FRir_grd_sig in GLA09.

0002021: Error in Calculation of Standard Deviation of Fit

A problem that caused the standard deviation of fit to be calculated incorrectly, and a problem that caused the standard fit to use the anc07 alternate convergence criteria were corrected.

0002019: Update anc45 VersionID 23

Anc45's for GLA06, and GLA12-GLA15 were updated to VersionID 23.

0002015: Old Unused Modules Should be Removed from Waveforms Directory

The src/waveforms directory has been removed. All relavent code has been moved to the src/wf_lib directory.

0002013: QABrowse Error for GLA10

The code was modified to handle GLA10 data with only one valid along-track point. The online documentation was updated.

0001993: WFQual Select Region Flags Descriptions are Unclear

Changed the Product Description for i_WFqual, bits 18 & 19.

0001992: GLA15 Elevation Wrong

Updated GSAS version to 4.3.1. Passed alternate ThresRng to PreGeoLoc for use when no std fit available. Now using Tide corrections for GLA06 elevation. Revised code such that lat/lon/elev are truely invalid values when no valid position is calculated. Put Centroid in GLA14%d_ldRngOff. Reworked ElvuseFlg logic to guarantee flag is set when elev is invalid. Removed Elvuseflg passthru code. Fixed bad comparisions with surf_ruf, solnSigmas, parmTr. Fixed bad comparison when setting GLA15%d_elev. Changed logic such that alt dtrop and std dtrop are evaluated independently. Fixed logic such that alternate geoloc rng used for PreGeoLoc is std unavailable.

0001986: Elevation Correction for Saturation

Added anc5201 (range saturation correction table), anc5202 (energy saturation correction table), and anc5203 (pulse width saturation correction table). anc5201 for gain > 13, and all of anc5202 & anc5203 are set to gi_invalid_i4b. These tables are used to set d_satRngCorr, d_satNrgCorr, d_satPwdCorr, and i_satCorrFlg which have been added to gla06 and 12-15 (see mantis 2048). i_satCorrFlg indicates the source of the saturation corrections. Bits 7 & 6 for d_satPwdCorr, bits 5 & 4 for d_satNrgCorr, and bits 3 through 0 for d_satRngCorr. The source is listed in the header of each file.

0001985: V4.3 i_CorrStatFlg(3) Definitions need Improvement in Database

Update made to i_CorrStatFlg.

0001980: GLA07 il_g_bscs_qf Definition Needs Updating in Database

Changed definition of i1_g_bscs_qf in GLA07 composite flag: i_532AttBS_Flag. Changed per description.

0001978: Add QAP Version Number Override.

Modules changed.

0001976: Error during Comparison of QAP04 Files

Fixed bug that allowed the code to address a nonexistent component of a structure.

0001971: Received Energy is not being Computed in GSAS 4.3

Added code to convert the standard deviation of noise from counts to volts for the call to C_CalcrNrg. Changed GD_THRNSIGR to 2.0d0. Modified C_CalcrNrg so that if either received energy is zero, then both are set to invalid.

0001946: Incorrect Calculation of QAP04 Metadata Statistics

Calculation of GLA04 metadata corrected.

0001939: Product Record Size Change

Increased product sizes in preparation for GSAS 5.0 parameter additions.

0001932: Modify QAPCompare to generate valid GLA03 metadata

Mantis 1932 updates the IDL QA read, browse, and metadata software to deal with changes to QAP03. anc07_001_01_0005.dat is no longer used. Metadata is now produced for QAP03.

001931: QAP03 Use of Non-science vs Science Limits for Engineering Values

The GLA03 limit-checking constants were updated to reflect science, rather than engineering, limits.

0001868: Incorporate SRTM DEM Data into GSAS Software

Two new parameters have been added to GLAS products 06 and 14 to hold high resolution DEM elevations and a source flag for that data. The parameters are:

i_DEM_hires_src(40) I*1 High resolution source flag

i_DEM_hires_elv(40) I*2 High resolution elevation

The unit of measure for the elevations is in meters. The source flag currently has only two values, such that:

0 = no value available

1 = SRTM data as source

The data used to fill these parameters is derived from the Shuttle Radar Topography Mission (SRTM), which was flown to map the world in three dimensions. One of the data products which resulted from this mission is a digital topographic map of the Earth's land surface with points spaced roughly 3 arc-seconds apart—roughly a resolution of 90 meters in latitude and in longitude. There is an inherent limitation in the data caused by the Shuttle's orbit, such that DEM values are only available between +60 and –60 degrees of latitude. All available SRTM elevations are now added to the specified products during production. Further high resolution elevations may be added from other

sources at a later date. The recorded values are corrected for the geoid elevation. The data assignment algorithm uses a weighted average of valid data points based on the 3x3 matrix of elevations surrounding a lat/lon position whenever the nearest point does not contain valid data.

0001839: Noisy WFs have Bad Alternate Fits

I fixed a problem in W_Estimates and that corrected some of the bad fits (see file pr1839_3.ppt), but not all of the bad fits. Bad fits fixed by mantis 0001945. Fixed in mantis 0001945.

0001798: 40 Hz Cloud Heights from the 1064 Channel

The full resolution 40 Hz cloud top heights, qa flag, and integrated signal, all from the 1064 nm data channel, have been added to GLA09 products.

0001005: Modify QAPG to Work with Changed QAP03_mod.

QAPG was modified to produce QAP03 files that dupulicate GLAS_L1A produced QAP03 files. Any differences between the QAPG and QAP files are due to storage discretization.

The i_LsrAmp out of bounds variable shows a significant difference between the two files. The l1a i_LsrAmp_out value (101.308) flags the yellow limit because it exceeds the 101 limit value. QAPG does not have the same precision for the variable and does not flag the yellow limit because the QAPG value for the variable is 101.

variable name, L1a value, QAPG value, difference

I_LSRAMP_C_N.NOUTOFLIMITS: 1860 66 -1794 ******

The difference is a result of storage discretization. The 9/26/2003 data used for testing coincided with laser start fire and the instrument had not yet settled causing the yellow limit to be exceeded.